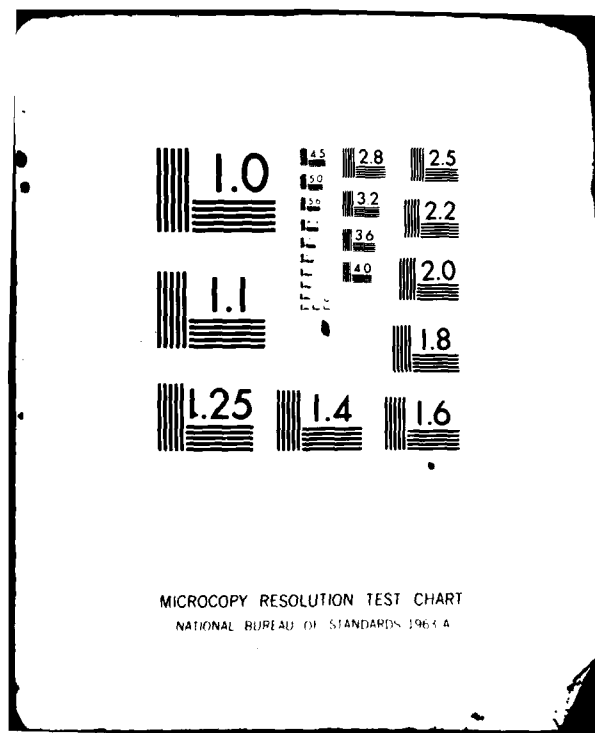


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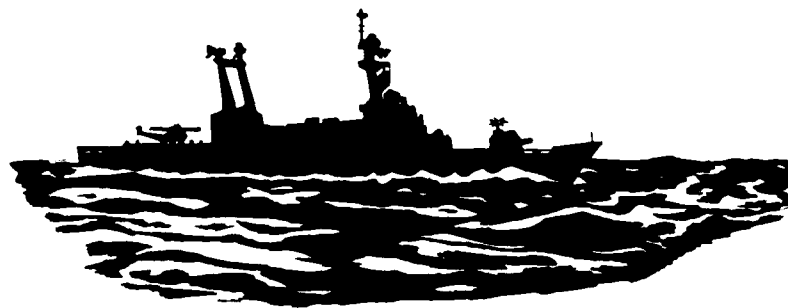


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TERMINAL REPORT  
1964 - 1973**



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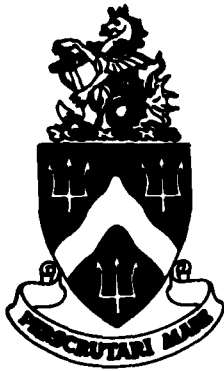
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| C82 - C96    | 6     |
| C96 - C109   | 7     |

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| 16. Abstract<br><p>Temperature variations are considered for Ocean Station CHARLIE using oceanographic data from 1964 to 1973, and sea surface temperatures from weather observations from 1948 to 1973. The oceanographic data appear to indicate a substantial non-seasonal cooling of the water column down to below 500 meters, beginning in 1971. In 1972 and 1973 all months are considerably cooler than any of the months for the years previous to 1971.</p> <p>Consideration of the annual means of the sea surface temperature from 1948 to 1973 showed that the 1971 to 1973 cooling period was not at all unique, but part of a cycle that could be traced back over at least two periods. Substantial temperature minimums are evident in the fifties, sixties, and seventies. There appears to be a 11 to 12 year periodicity to the cycles.</p> |  |  |
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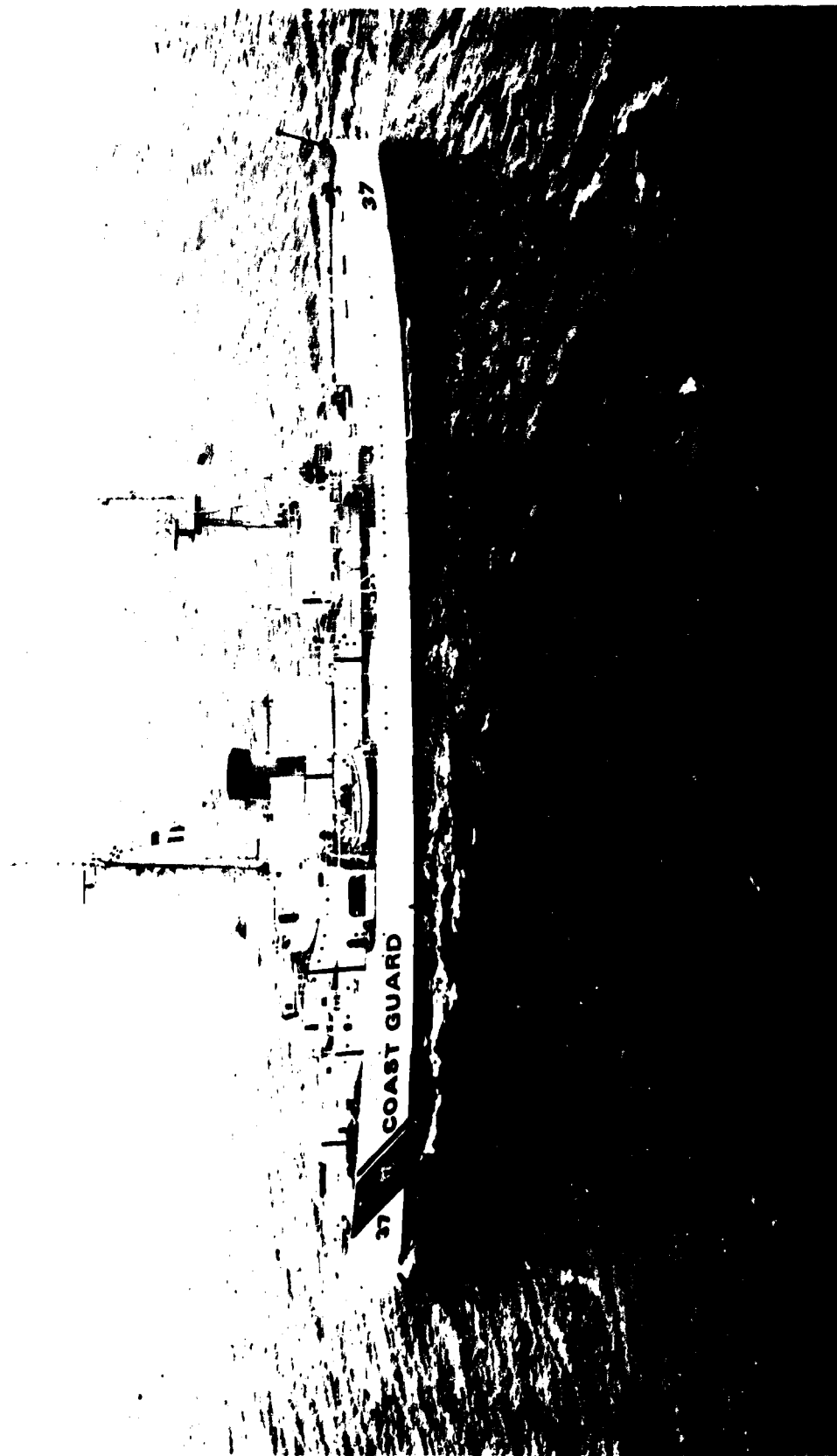
## **OCEANOGRAPHIC OBSERVATIONS**

### **NORTH ATLANTIC OCEAN STATION CHARLIE TERMINAL REPORT**

**1964 - 1973**

***Lawrence J. Hannon***

**United States Coast Guard  
Oceanographic Unit  
Washington, D.C.**



USCGC TANEY (WHEC-37)

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## ABSTRACT

Temperature variations are considered for Ocean Station CHARLIE using oceanographic data from 1964 to 1973, and sea surface temperatures from weather observations from 1948 to 1973. The oceanographic data appear to indicate a substantial non-seasonal cooling of the water column down to below 500 meters, beginning in 1971. In 1972 and 1973 all months are considerably cooler than any of the months for the years previous to 1971.

Consideration of the annual means of the sea surface temperature from 1948 to 1973 showed that the 1971 to 1973 cooling period was not at all unique, but part of a cycle that could be traced back over at least two periods. Substantial temperature minimums are evident in the fifties, sixties, and seventies. There appears to be a 11 to 12 year periodicity to the cycles.

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## TABLE OF CONTENTS

|   | <i>Page</i> |
|---|-------------|
| Title Page .....  | i           |
| Frontispiece .....  | ii          |
| Abstract .....  | iii         |
| Table of Contents .....   | v           |
| List of Illustrations .....   | v           |
| List of Tables .....  | v           |
| Appendices .....  | v           |
| Introduction .....  | 1           |
| Temperature Time Series Data for Ocean Station CHARLIE, May 1966 to December 1973 .....     | 1           |
| Annual Mean Sea Surface Temperature Variations on Ocean Station CHARLIE, 1948 to 1973 ..... | 2           |
| References .....  | 3           |
| Illustrations .....   | 5           |
| Data Microfiche .....   | Back Cover  |

## LIST OF ILLUSTRATIONS

### Figure

#### Frontispiece:

|    |  |    |
|----|--|----|
|    | USCGC TANEY (WHEC-37) .....  | ii |
| 1. | Chart showing the locations of the North Atlantic Ocean Stations ..  | 5  |
| 2. | Monthly mean isotherm (°C) vertical distribution to 1000 meters at Ocean Station CHARLIE, 1966 to 1973 ..... | 7  |
| 3. | The annual mean sea surface temperature for Ocean Station CHARLIE, 1948 to 1973 .....                        | 9  |

## LIST OF TABLES

### Table

|    |  |    |
|----|--|----|
| 1. | Summary of Oceanographic Operations at Ocean Station CHARLIE, 1964 to 1973 ..... | 11 |
|----|--|----|

## APPENDICES

### Appendix

|    |  |    |
|----|--|----|
| A. | Data Listings for Cruises C-21 through C-109 ..... | 12 |
|    | Codes Utilized for Station Data .....              | 15 |

# **OCEANOGRAPHIC OBSERVATIONS AT OCEAN STATION CHARLIE TERMINAL REPORT**

**1964—1973**

**By**

**Lawrence J. Hannon<sup>1</sup>**

## **INTRODUCTION**

Oceanographic observations were taken at Ocean Station CHARLIE (52°45'N, 35°30'W) in the North Atlantic (Fig. 1) in June, August, November, and December 1964, and in January 1965. Starting in May 1966, CHARLIE was occupied every month until December 1973, with only three exceptions. No observations were taken in January and December 1967, and in December 1972. The oceanographic data which have not been published are listed in Appendix A. The rest of the oceanographic data is available in the previous reports of this series (Husby, 1966 and 1968; Hannon, 1974) or from the National Oceanographic Data Center (NODC), Washington, D.C. All the cruises on CHARLIE are listed in Table 1, together with the NODC Reference numbers for these cruises.

The quality control procedures and data processing methods have been covered by Rosebrook (1971). Vessels taking oceanographic stations used either Nansen casts or the Plessey Model 9040 S/T/D Environmental Profiling System. Salinities were run on board using either a Beckman or Plessey inductive salinometer.

While the previous reports in this series concentrated on only one year of data, this report covers the whole period from 1964 to 1973. The previous reports concentrated on water mass analysis. This report will concentrate on the continuous temperature time series from 1966 to 1973, and the significant cycles that appear to be characteristic for CHARLIE. (Data in 1964 and 1965 were not continuous and are not, therefore, part of the oceanographic time series). Weather observations

taken on CHARLIE provide a means of extending the observational period for sea surface temperatures back to 1948. (Data for 1964 and 1965 are continuous for these observations and are included in the analysis). These are available from the National Climatic Center in Asheville, North Carolina.

## **TEMPERATURE TIME SERIES DATA FOR OCEAN STATION CHARLIE, MAY 1966 TO DECEMBER 1973**

The temperature time series for May 1966 to December 1973 is based on the monthly averages of over 1700 oceanographic stations over the period. Although over 1800 stations were taken, only those which were within 30 nautical miles (56 kilometers) of CHARLIE were averaged to determine the monthly means (Fig. 2). Values are interpolated between existing data for January and December 1967, and December 1972.

The seasonal influences are evident from year to year, but only appear to influence the water column to about 100 meters. The most significant variation is the non-seasonal decrease in temperature of a large part of the water column over the period of several years. The decrease appears to start in 1971 and continues through 1973.

In February 1971, the sea surface temperature was less than 6°C, for the first time in the series. The cooling off of the surface is indicated by the rise to the surface of the 6°C isotherm. The cooling trend continued in 1972 with surface temperatures less than 6°C in February, March, April, and May.

<sup>1</sup>U.S. Coast Guard Oceanographic Unit, Bld. 159-E Navy Yard Annex, Washington, D.C. 20593.

Finally the coldest sea surface temperatures of less than 5°C were reached in February 1973.

The temperature decrease involved more than just the surface. The fluctuation of the 4.5°C isotherm indicates that a substantial part of the water column was influenced throughout the cooling period. The depth of influence appears to have been greater than 500 meters, especially in 1972.

**ANNUAL MEAN SEA SURFACE  
TEMPERATURE VARIATIONS ON  
OCEAN STATION CHARLIE, 1948 TO  
1973**

The cooling off of CHARLIE appeared to be a part of a cycle. Unfortunately Nansen and STD casts were not taken prior to 1964, but climatological observations were made at synoptic hours (four times a day) starting in 1948. This record includes sea surface temperatures taken us-

ing injection temperatures, bucket temperatures, bathythermographs, expendable bathythermographs, Nansen casts, and STD casts.

If CHARLIE has undergone a non-seasonal cyclic temperature variation, it should be evident in the annual means of the sea surface temperature record, covering 1948 to 1973. The annual means of the sea surface temperature for 1948 to 1968 were taken from Zverev (1972). For the period 1969 to 1973 the annual means of the sea surface temperature were determined by averaging the monthly means for each year from the climatological summaries of CHARLIE given in the Mariners Weather Log. The resulting annual mean sea surface temperatures at CHARLIE for the entire 1948 to 1973 period are presented in Figure 3.

The record shows that there were two other cold periods at CHARLIE besides the 1971 to 1973 period, one from 1949 to 1950, and one from 1959 to 1961. The periodicity of the annual means appears to be about 11 to 12 years.

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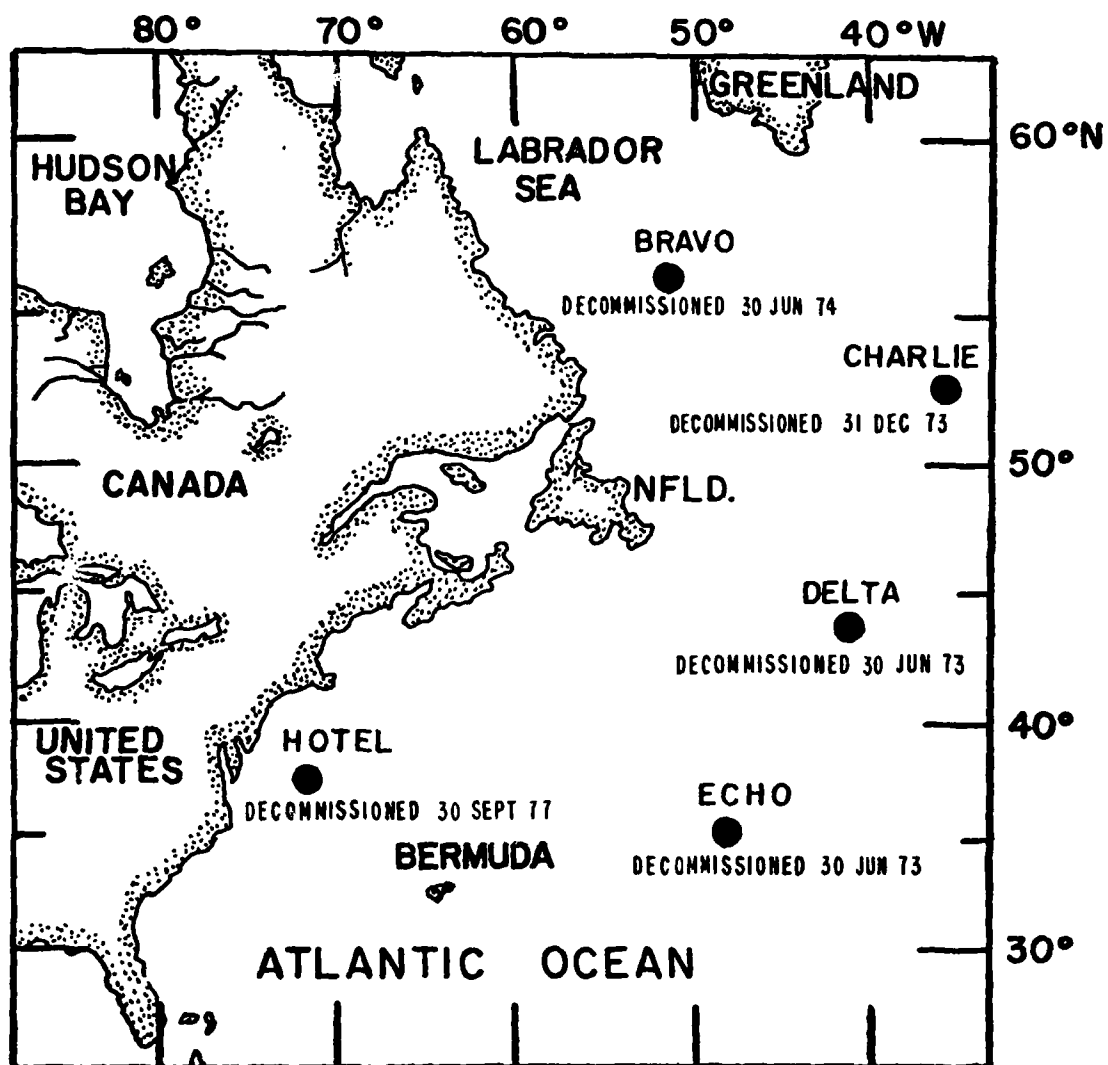


Figure 1.—Chart showing the locations of the North Atlantic Ocean Stations.

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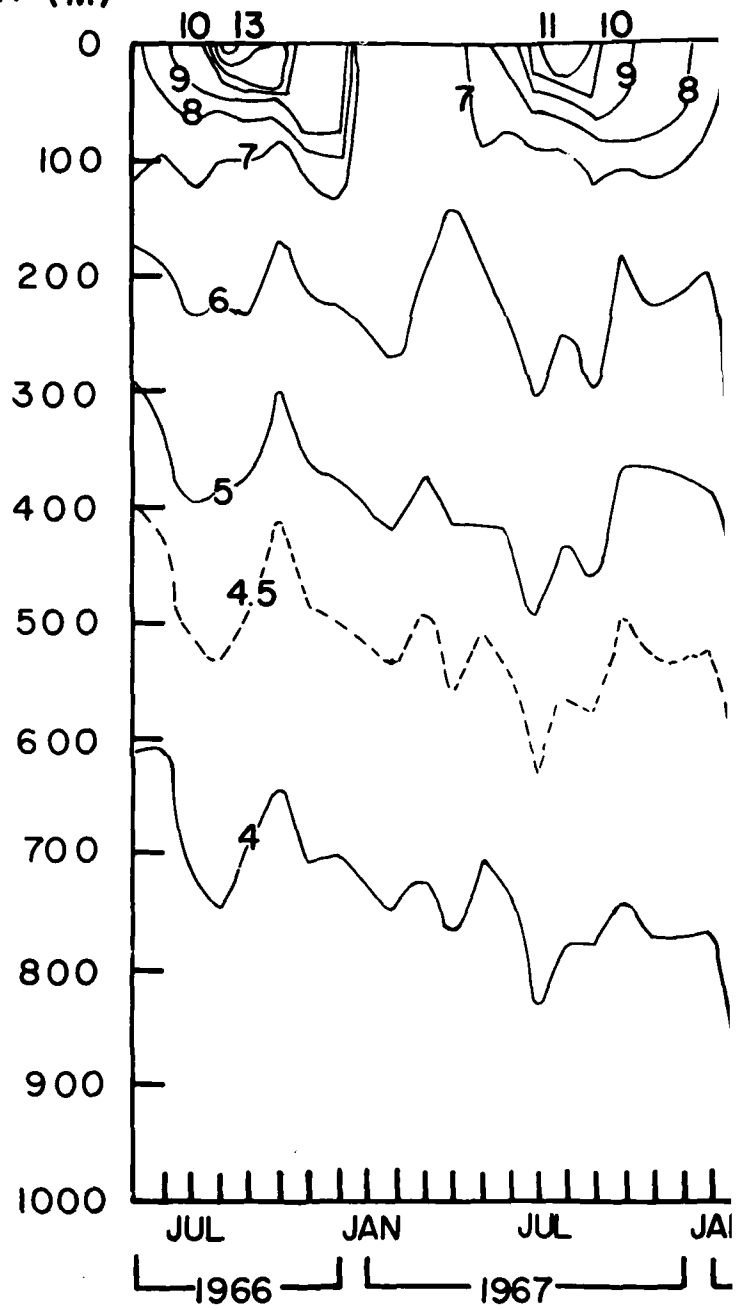
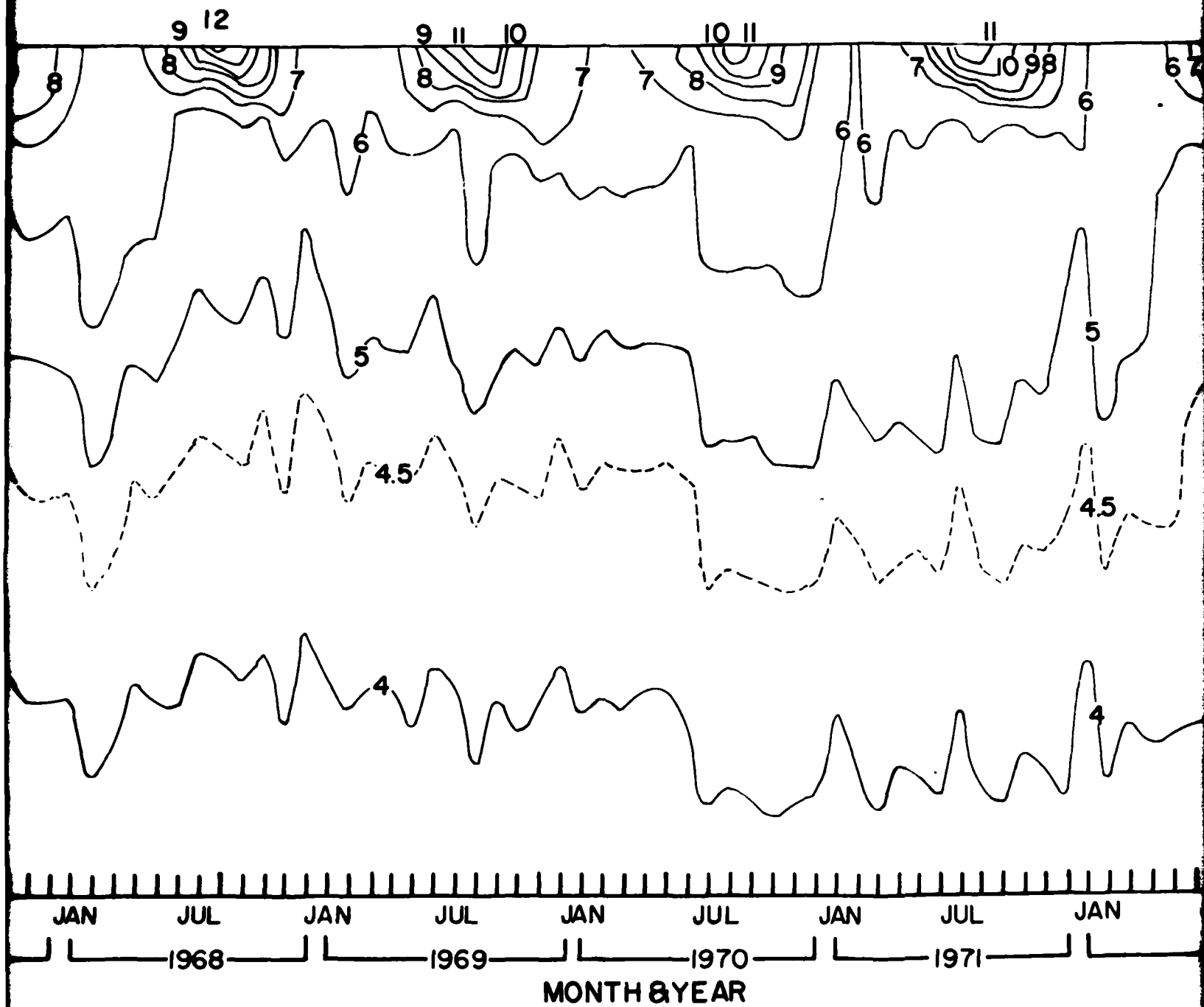
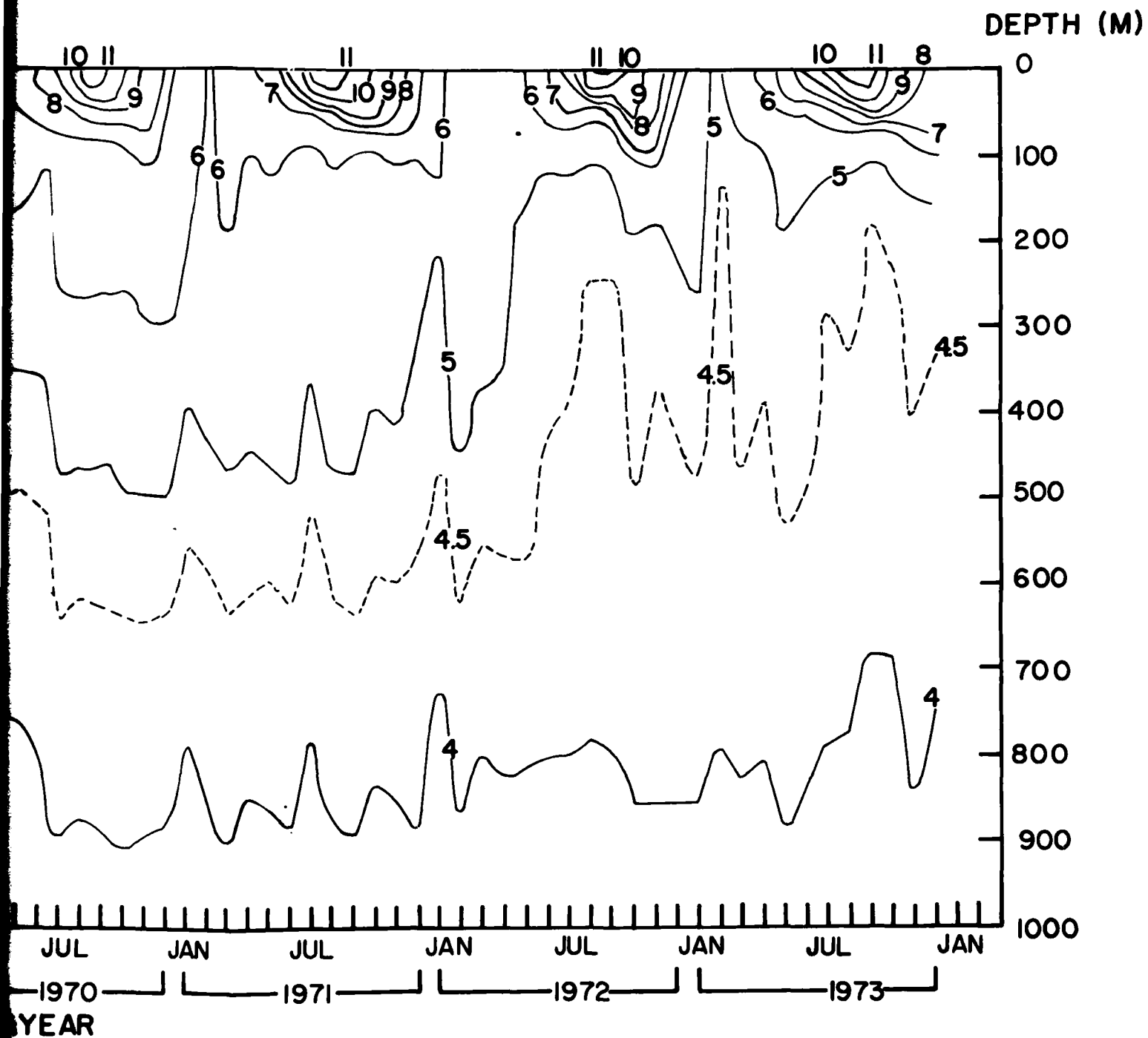


Figure 2.—Monthly mean isotherm (°C) vertical distribution to 1000 meters at Ocean S



at Ocean Station CHARLIE, 1966 to 1973.

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3



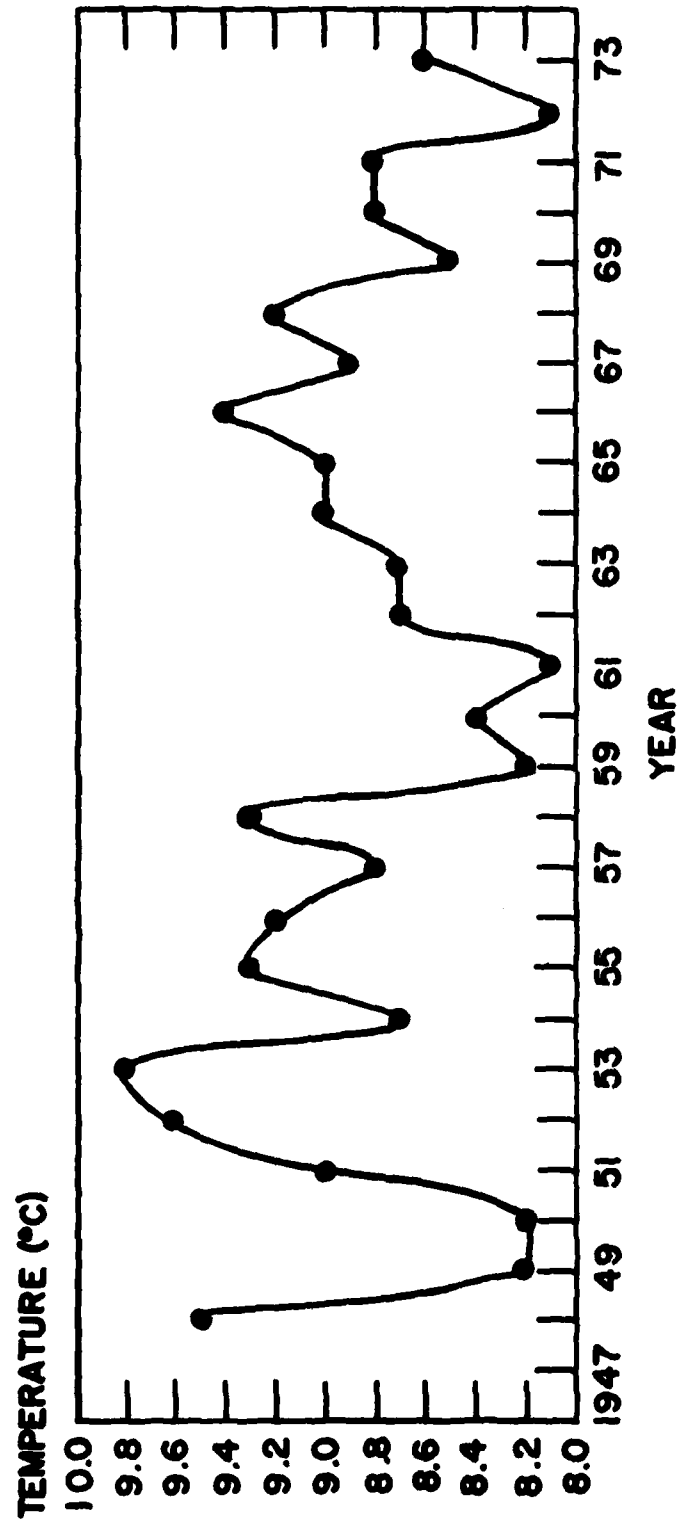


Figure 3.—The annual mean sea surface temperature for Ocean Station CHARLIE, 1948 to 1973. (Annual means for 1948 to 1968 after Zverev, 1972. Annual means for 1969 to 1973 were computed from the monthly means as given in the climatological summaries in the Mariners Weather Log).

Table 1 Summary of Oceanographic Operations on Ocean Station CHARLIE, 1964 to 1973

| CRUISE NO. | CUTTER          | DATES             | NO. STA. | DATE              | CRUISE NO. | CUTTER            | DATES             | NO. STA. | DATE    |
|------------|-----------------|-------------------|----------|-------------------|------------|-------------------|-------------------|----------|---------|
| C-1        | COC INDIAN      | 06/10/64-06/30/64 | 15       | 02/25/71-03/20/71 | C-65       | COC ANDUSCOGGIN   | 02/25/71-03/20/71 | 11       | 31-1869 |
| C-2        | COC SPENCER     | 06/05/64-06/15/64 | 15       | 03/20/71-04/12/71 | C-66       | COC GALLATIN      | 03/20/71-04/12/71 | 20       | 31-1862 |
| C-3        | COC MENDOTA     | 11/27/64-12/15/64 | 16       | 04/18/71-05/05/71 | C-67       | COC DUANE         | 04/18/71-05/05/71 | 20       | 31-1859 |
| C-4        | COC INDIAN      | 01/07/65-01/26/65 | 14       | 05/07/71-05/26/71 | C-68       | COC ESCANABA      | 05/07/71-05/26/71 | 16       | 31-1855 |
| C-5        | COC DUANE       | 05/05/65-05/26/65 | 14       | 05/26/71-06/20/71 | C-69       | COC MCCULLOCH     | 05/26/71-06/20/71 | 15       | 31-1856 |
| C-6        | COC HALPPOON    | 06/20/65-07/11/65 | 20       | 06/20/71-07/18/71 | C-70       | COC CAMPBELL      | 06/20/71-07/18/71 | 19       | 31-1878 |
| C-7        | COC MUMBLUT     | 06/03/65-06/23/65 | 23       | 07/18/71-08/05/71 | C-71       | COC ESCANABA      | 07/18/71-08/05/71 | 19       | 31-1878 |
| C-8        | COC MUMBLUT     | 06/17/65-07/03/65 | 19       | 08/05/71-08/22/71 | C-72       | COC ESCANABA      | 08/05/71-08/22/71 | 23       | 31-1878 |
| C-9        | COC INDIAN      | 11/15/65-11/17/65 | 19       | 08/22/71-09/04/71 | C-73       | COC CHASE         | 08/22/71-09/04/71 | 23       | 31-1878 |
| C-10       | COC INDIAN      | 04/13/67-04/17/67 | 14       | 09/04/71-09/24/71 | C-74       | COC CHASE         | 09/04/71-09/24/71 | 23       | 31-1878 |
| C-11       | COC INDIAN      | 05/22/67-06/10/67 | 14       | 09/24/71-10/16/71 | C-75       | COC ASKECUN       | 09/24/71-10/16/71 | 15       | 31-1825 |
| C-12       | COC CASTLEHULA  | 07/09/67-08/14/67 | 21       | 10/16/71-11/11/71 | C-76       | COC GALLATIN      | 10/16/71-11/11/71 | 31       | 31-8291 |
| C-13       | COC MENDOTA     | 08/02/67-08/24/67 | 21       | 11/11/71-12/13/71 | C-77       | COC GALLATIN      | 11/11/71-12/13/71 | 19       | 31-8277 |
| C-14       | COC CINCOTEAQUE | 08/26/67-09/16/67 | 21       | 12/25/71-12/31/71 | C-78       | COC MIBB          | 12/25/71-12/31/71 | 7        | 31-8278 |
| C-15       | COC MIBB        | 10/09/67-11/01/67 | 21       | 01/03/72-01/27/72 | C-79       | COC MIBB          | 01/03/72-01/27/72 | 3        | 31-1941 |
| C-16       | COC UASCO       | 11/28/67-11/30/67 | 11       | 02/11/72-03/06/72 | C-80       | COC SPENCER       | 02/11/72-03/06/72 | 25       | 31-8293 |
| C-17       | COC SEBAU       | 01/09/68-01/31/68 | 12       | 03/06/72-03/26/72 | C-81       | COC GALLATIN      | 03/06/72-03/26/72 | 8        | 31-2060 |
| C-18       | COC ESCANABA    | 02/24/68-03/18/68 | 17       | 04/23/72-05/16/72 | C-82       | COC ORASCO        | 04/23/72-05/16/72 | 36       | 31-8292 |
| C-19       | COC SPENCER     | 04/19/68-05/03/68 | 55       | 05/16/72-06/06/72 | C-83       | COC SPENCER       | 05/16/72-06/06/72 | 15       | 31-8305 |
| C-20       | COC MANDITON    | 05/03/68-05/26/68 | 20       | 06/06/72-06/28/72 | C-84       | COC PUNICHANTHAIN | 06/06/72-06/28/72 | 15       | 31-2001 |
| C-21       | COC MCCULLOCH   | 05/19/68-07/11/68 | 20       | 06/28/72-07/18/72 | C-85       | COC MIBB          | 06/28/72-07/18/72 | 10       | 31-8306 |
| C-22       | COC MENDOTA     | 07/11/68-07/11/68 | 23       | 07/18/72-08/04/72 | C-86       | COC SPENCER       | 07/18/72-08/04/72 | 13       | 31-8306 |
| C-23       | COC ESCANABA    | 07/11/68-07/11/68 | 23       | 08/04/72-08/18/72 | C-87       | COC SPENCER       | 08/04/72-08/18/72 | 16       | 31-8312 |
| C-24       | COC SPENCER     | 07/31/68-08/21/68 | 10       | 08/18/72-09/04/72 | C-88       | COC CHASE         | 08/18/72-09/04/72 | 23       | 31-8312 |
| C-25       | COC MANDITON    | 08/21/68-09/13/68 | 26       | 09/04/72-09/29/72 | C-89       | COC ORASCO        | 09/04/72-09/29/72 | 23       | 31-8312 |
| C-26       | COC MANDITON    | 09/13/68-09/13/68 | 26       | 09/29/72-10/23/72 | C-90       | COC CAMPBELL      | 09/29/72-10/23/72 | 22       | 31-8320 |
| C-27       | COC CINCOTEAQUE | 10/16/68-10/29/68 | 15       | 10/23/72-10/30/72 | C-91       | COC MURGETHAW     | 10/23/72-10/30/72 | 3        | 31-2093 |
| C-28       | COC CUOR INLET  | 10/29/68-10/29/68 | 15       | 11/03/72-11/17/72 | C-92       | COC MURGETHAW     | 11/03/72-11/17/72 | 5        | 31-8321 |
| C-29       | COC ASKECUN     | 11/21/68-12/13/68 | 9        | 11/17/72-12/13/72 | C-93       | COC GALLATIN      | 11/17/72-12/13/72 | 5        | 31-8323 |
| C-30       | COC DUANE       | 12/13/68-12/13/68 | 9        | 12/13/72-01/27/73 | C-94       | COC SPENCER       | 12/13/72-01/27/73 | 1        | 31-2134 |
| C-31       | COC MANDITON    | 12/13/68-01/05/69 | 12       | 01/27/73-02/16/73 | C-95       | COC SPENCER       | 01/27/73-02/16/73 | 12       | 31-8330 |
| C-32       | COC YARUTAI     | 01/05/69-01/28/69 | 18       | 02/16/73-03/11/73 | C-96       | COC HAMILTON      | 02/16/73-03/11/73 | 36       | 31-8334 |
| C-33       | COC CASCO       | 01/28/69-02/20/69 | 17       | 03/11/73-04/02/73 | C-97       | COC TANEY         | 03/11/73-04/02/73 | 4        | 31-2191 |
| C-34       | COC CASTLEHOCK  | 02/20/69-03/13/69 | 62       | 04/02/73-04/26/73 | C-98       | COC CHASE         | 04/02/73-04/26/73 | 33       | 31-8340 |
| C-35       | COC MUMBLUT     | 04/13/69-04/30/69 | 22       | 04/26/73-05/18/73 | C-99       | COC DUANE         | 04/26/73-05/18/73 | 14       | 31-2227 |
| C-36       | COC MCCULLOCH   | 04/30/69-05/23/69 | 13       | 05/18/73-06/09/73 | C-100      | COC MUMBLUT       | 05/18/73-06/09/73 | 21       | 31-8345 |
| C-37       | COC CAMPBELL    | 05/23/69-06/15/69 | 16       | 06/09/73-07/01/73 | C-101      | COC HAMILTON      | 06/09/73-07/01/73 | 12       | 31-8346 |
| C-38       | COC SPENCER     | 06/15/69-07/06/69 | 9        | 07/01/73-07/25/73 | C-102      | COC MURGETHAW     | 07/01/73-07/25/73 | 15       | 31-2233 |
| C-39       | COC MANDITON    | 07/06/69-07/06/69 | 62       | 07/25/73-08/16/73 | C-103      | COC MURGETHAW     | 07/25/73-08/16/73 | 15       | 31-2241 |
| C-40       | COC MANDITON    | 07/31/69-08/23/69 | 62       | 08/16/73-09/04/73 | C-104      | COC PUNICHANTHAIN | 08/16/73-09/04/73 | 12       | 31-2241 |
| C-41       | COC ASKECUN     | 08/23/69-09/13/69 | 27       | 09/04/73-09/29/73 | C-105      | COC SPENCER       | 09/04/73-09/29/73 | 3        | 31-2245 |
| C-42       | COC MURGETHAW   | 08/23/69-09/13/69 | 27       | 09/29/73-10/18/73 | C-106      | COC CAMPBELL      | 09/29/73-10/18/73 | 3        | 31-2245 |
| C-43       | COC DUANE       | 09/13/69-10/08/69 | 9        | 10/18/73-11/06/73 | C-107      | COC DALLAS        | 10/18/73-11/06/73 | 19       | 31-8351 |
| C-44       | COC SPENCER     | 10/04/69-11/31/69 | 55       | 11/06/73-12/16/73 | C-108      | COC DUANE         | 11/06/73-12/16/73 | 3        | 31-2247 |
| C-45       | COC UASCO       | 10/31/69-11/23/69 | 14       | 12/16/73-12/31/73 | C-109      | COC MURGETHAW     | 12/16/73-12/31/73 | 9        | 31-8373 |
| C-46       | COC CAMPBELL    | 11/23/69-12/16/69 | 16       |                   |            |                   |                   |          |         |
| C-47       | COC INDIAN      | 12/16/69-01/06/70 | 3        |                   |            |                   |                   |          |         |
| C-48       | COC MIBB        | 01/08/70-01/31/70 | 14       |                   |            |                   |                   |          |         |
| C-49       | COC CINCOTEAQUE | 01/31/70-02/23/70 | 15       |                   |            |                   |                   |          |         |
| C-50       | COC ASKECUN     | 03/14/70-04/10/70 | 15       |                   |            |                   |                   |          |         |
| C-51       | COC MOUTELL     | 04/10/70-05/03/70 | 20       |                   |            |                   |                   |          |         |
| C-52       | COC CASTLEHOCK  | 05/03/70-05/29/70 | 14       |                   |            |                   |                   |          |         |
| C-53       | COC UASCO       | 05/29/70-06/18/70 | 23       |                   |            |                   |                   |          |         |
| C-54       | COC CINCOTEAQUE | 06/18/70-07/11/70 | 23       |                   |            |                   |                   |          |         |
| C-55       | COC SPENCER     | 07/11/70-08/03/70 | 13       |                   |            |                   |                   |          |         |
| C-56       | COC MCCULLOCH   | 08/03/70-08/27/70 | 13       |                   |            |                   |                   |          |         |
| C-57       | COC INDIAN      | 09/22/70-09/27/70 | 14       |                   |            |                   |                   |          |         |
| C-58       | COC CINCOTEAQUE | 09/27/70-10/19/70 | 21       |                   |            |                   |                   |          |         |
| C-59       | COC ASKECUN     | 10/19/70-11/02/70 | 14       |                   |            |                   |                   |          |         |
| C-60       | COC MIBB        | 11/02/70-11/25/70 | 9        |                   |            |                   |                   |          |         |
| C-61       | COC CHASE       | 11/25/70-12/16/70 | 12       |                   |            |                   |                   |          |         |
| C-62       | COC CUOR INLET  | 12/16/70-01/10/71 | 12       |                   |            |                   |                   |          |         |
| C-63       | COC MCCULLOCH   | 01/10/71-02/02/71 | 2        |                   |            |                   |                   |          |         |
| C-64       | COC DUANE       | 02/02/71-02/25/71 | 6        |                   |            |                   |                   |          |         |

## APPENDIX A OCEANOGRAPHIC DATA LISTINGS

- Table I.—USCGC McCULLOCH, 3 May 1968—26 May 1968, NODC Listing No. 31-1264.
- Table II.—USCGC HUMBOLDT, 26 May 1968—18 June 1968, NODC Listing No. 31-1275.
- Table III.—USCGC MENDOTA, 18 June 1968—11 July 1968, NODC Listing No. 31-1293.
- Table IV.—USCGC ESCANABA, 11 July 1968—31 July 1968, NODC Listing No. 31-1272.
- Table V.—USCGC SPENCER, 31 July 1968—21 August 1968, NODC Listing No. 31-1308.
- Table VI.—USCGC HAMILTON, 21 August 1968—13 September 1968, NODC Listing No. 31-8056.
- Table VII.—USCGC CHINCOTEAGUE, 13 September 1968—6 October 1968, NODC Listing No. 31-1354.
- Table VIII.—USCGC COOK INLET, 6 October 1968—29 October 1968, NODC Listing No. 31-1350.
- Table IX.—USCGC ABSECON, 29 October 1968—21 November 1968, NODC Listing No. 31-1347.
- Table X.—USCGC DUANE, 21 November 1968—13 December 1968, NODC Listing No. 31-1392.
- Table XI.—USCGC HAMILTON, 13 December 1968—5 January 1969, NODC Listing No. 31-1394.
- Table XII.—USCGC YAKUTAT, 5 January 1969—28 January 1969, NODC Listing No. 31-1399.
- Table XIII.—USCGC CASCO, 28 January 1969—20 February 1969, NODC Listing No. 31-1400.
- Table XIV.—USCGC CASTLEROCK, 20 February 1969—13 March 1969, NODC Listing No. 31-8091.
- Table XV.—USCGC HUMBOLDT, 13 March 1969—7 April 1969, NODC Listing No. 31-1447.
- Table XVI.—USCGC McCULLOCH, 7 April 1969—30 April 1969, NODC Listing No. 31-1448.
- Table XVII.—USCGC CAMPBELL, 30 April 1969—23 May 1969, NODC Listing No. 31-1453.
- Table XVIII.—USCGC SHERMAN, 23 May 1969—15 June 1969, NODC Listing No. 31-8111.
- Table XIX.—USCGC GALLATIN, 15 June 1969—8 July 1969, NODC Listing No. 31-8114.
- Table XX.—USCGC BOUTWELL, 8 July 1969—31 July 1969, NODC Listing No. 31-8115.
- Table XXI.—USCGC ABSECON, 31 July 1969—23 August 1969, NODC Listing No. 31-8119.
- Table XXII.—USCGC MORGENTHAU, 23 August 1969—15 September 1969, NODC Listing No. 31-8133.
- Table XXIII.—USCGC DUANE, 15 September 1969—8 October 1969, NODC Listing No. 31-1518.
- Table XXIV.—USCGC SHERMAN, 8 October 1969—31 October 1969, NODC Listing No. 31-8140.
- Table XXV.—USCGC OWASCO, 31 October 1969—23 November 1969, NODC Listing No. 31-1548.
- Table XXVI.—USCGC CAMPBELL, 23 November 1969—16 December 1969, NODC Listing No. 31-1556.
- Table XXVII.—USCGC INGHAM, 16 December 1969—8 January 1970, NODC Listing No. 31-1576.
- Table XXVIII.—USCGC BIBB, 8 January 1970—31 January 1970, NODC Listing No. 31-1590.
- Table XXIX.—USCGC CHINCOTEAGUE, 31 January 1970—23 February 1970, NODC Listing No. 31-1599.
- Table XXX.—USCGC ABSECON, 18 March 1970—10 April 1970, NODC Listing No. 31-1632.
- Table XXXI.—USCGC BOUTWELL, 10 April 1970—3 May 1970, NODC Listing No. 31-1614.
- Table XXXII.—USCGC CASTLEROCK, 3 May 1970—26 May 1970, NODC Listing No. 31-1594.
- Table XXXIII.—USCGC OWASCO, 26 May 1970—18 June 1970, NODC Listing No. 31-1643.
- Table XXXIV.—USCGC CHINCOTEAGUE, 18 June 1970—11 July 1970, NODC Listing No. 31-1668.

Table XXXV.—USCGC SPENCER, 11 July 1970—3 August 1970, NODC Listing No. 31-1672.

Table XXXVI.—USCGC McCULLOCH, 3 August 1970—26 August 1970, NODC Listing No. 31-1686.

Table XXXVII.—USCGC INGHAM, 26 August 1970—18 September 1970, NODC Listing No. 31-1700.

Table XXXVIII.—USCGC CHINCOTEAGUE, 18 September 1970—10 October 1970, NODC Listing No. 31-8231.

Table XXXIX.—USCGC ABSECON, 10 October 1970—2 November 1970, NODC Listing No. 31-1770.

Table XL.—USCGC BIBB, 2 November 1970—25 November 1970, NODC Listing No. 31-1746.

Table XLI.—USCGC CHASE, 25 November 1970—18 December 1970, NODC Listing No. 31-8233.

Table XLII.—USCGC COOK INLET, 18 December 1970—10 January 1971, NODC Listing No. 31-1783.

Table XLIII.—USCGC McCULLOCH, 10 January 1971—2 February 1971, NODC Listing No. 31-1795.

Table XLIV.—USCGC DUANE, 2 February 1971—25 February 1971, NODC Listing No. 31-1794.

Table XLV.—USCGC ANDROSCOGGIN, 25 February 1971—20 March 1971, NODC Listing No. 31-1809.

Table XLVI.—USCGC GALLATIN, 20 March 1971—12 April 1971, NODC Listing No. 31-1842.

Table XLVII.—USCGC DUANE, 14 April 1971—5 May 1971, NODC Listing No. 31-1859.

Table XLVIII.—USCGC ESCANABA, 7 May 1971—28 May 1971, NODC Listing No. 31-1855.

Table XLIX.—USCGC McCULLOCH, 28 May 1971—20 June 1971, NODC Listing No. 31-1856.

Table L.—USCGC CAMPBELL, 20 June 1971—14 July 1971, NODC Listing No. 31-1881.

Table LI.—USCGC ESCANABA, 14 July 1971—5 August 1971, NODC Listing No. 31-1878.

Table LII.—USCGC BIBB, 5 August 1971—29 August 1971, NODC Listing No. 31-1876.

Table LIII.—USCGC CHASE, 29 August 1971—24 September 1971, NODC Listing No. 31-1884.

Table LIV.—USCGC ABSECON, 24 September 1971—16 October 1971, NODC Listing No. 31-1925.

Table LV.—USCGC GALLATIN, 16 October 1971—11 November 1971, NODC Listing No. 31-8291.

Table LVI.—USCGC DALLAS, 11 November 1971—10 December 1971, NODC Listing No. 31-8277.

Table LVII.—USCGC GALLATIN, 25 December 1971—31 December 1971, NODC Listing No. 31-8278.

Table LVIII.—USCGC BIBB, 31 December 1971—22 January 1972, NODC Listing No. 31-1941.

Table LIX.—USCGC BOUTWELL, 11 February 1972—6 March 1972, NODC Listing No. 31-8293.

Table LX.—USCGC SPENCER, 6 March 1972—26 March 1972, NODC Listing No. 31-2080.

Table LXI.—USCGC GALLATIN, 26 March 1972—29 March 1972, NODC Listing No. 31-8292.

Table LXII.—USCGC OWASCO, 23 April 1972—16 May 1972, NODC Listing No. 31-8305.

Table LXIII.—USCGC SPENCER, 16 May 1972—8 June 1972, NODC Listing No. 31-2001.

Table LXIV.—USCGC PONTCHARTRAIN, 8 June 1972—28 June 1972, NODC Listing No. 31-2082.

Table LXV.—USCGC WINNEBAGO, 28 June 1972—18 July 1972, NODC Listing no. 31-8300.

Table LXVI.—USCGC SPENCER, 18 July 1972—9 August 1972, NODC Listing no. 31-2094.

Table LXVII.—USCGC SHERMAN, 9 August 1972, 3 September 1972, NODC Listing No. 31-8312.

Table LXVIII.—USCGC CHASE, 3 September 1972—29 September 1972, NODC Listing no. 31-8316.

Table LXIX.—USCGC OWASCO, 29 September 1972—23 October 1972, NODC Listing No. 31-8320.

Table LXX.—USCGC CAMPBELL, 23 October 1972—30 October 1972, NODC Listing No. 31-2097.

Table LXXI.—USCGC MORGENTHAU, 30 October 1972—17 November 1972, NODC Listing No. 31-2093.

Table LXXII.—USCGC BOUTWELL, 17 November 1972—13 December 1972, NODC Listing No. 31-8321.

Table LXXIII.—USCGC GALLATIN, 3 January 1973—27 January 1973, NODC Listing No. 31-8323.

Table LXXIV.—USCGC SPENCER, 27 January 1973—16 February 1973, NODC Listing no. 31-2138.

Table LXXV.—USCGC HAMILTON, 16 February 1973—11 March 1973, NODC Listing No. 31-8330.

Table LXXVI.—USCGC ESCANABA, 11 March 1973—2 April 1973, NODC Listing No. 31-8334.  
Table LXXVII.—USCGC TANEY, 2 April 1973—24 April 1973, NODC Listing No. 31-2191.  
Table LXXVIII.—USCGC CHASE, 24 April 1973—18 May 1973, NODC Listing No. 31-8340.  
Table LXXIX.—USCGC DUANE, 18 May 1973—9 June 1973, NODC Listing No. 31-2227.  
Table LXXX.—USCGC MUNRO, 9 June 1973—1 July 1973, NODC Listing No. 31-8345.  
Table LXXXI.—USCGC HAMILTON, 1 July 1973—25 July 1973, NODC Listing No. 31-8346.  
Table LXXXII.—USCGC MORGENTHAU, 25 July 1973—16 August 1973, NODC Listing No. 31-2233.  
Table LXXXIII.—USCGC INGHAM, 16 August 1973—5 September 1973, NODC Listing No. 31-2241.  
Table LXXXIV.—USCGC PONTCHARTRAIN, 6 September 1973—20 September 1973, NODC Listing No. 31-2244.  
Table LXXXV.—USCGC SPENCER, 20 September 1973—16 October 1973, NODC Listing No. 31-2245.  
Table LXXXVI.—USCGC CAMPBELL, 16 October 1973—6 November 1973, NODC Listing No. 31-2246.  
Table LXXXVII.—USCGC DALLAS, 6 November 1973—26 November 1973, NODC Listing No. 31-8351.  
Table LXXXVIII.—USCGC DUANE, 26 November 1973—16 December 1973, NODC Listing No. 31-2247.  
Table LXXXIX.—USCGC MORGENTHAU, 16 December 1973—31 December 1973, NODC Listing No. 31-8373.

## Codes Utilized

A complete description of the codes utilized in the tabulation of oceanographic station data can be found in National Oceanographic Data Center publication M-2, **Processing Physical and Chemical Data from Oceanographic Stations**. (Rev. August 1964, supplement issued May 1966.)

To facilitate use of the oceanographic station data listing, entry headings which are not self-explanatory are described below.

|                          |  |
|--------------------------|--|
| REFID .....              | NODC reference identity number.  |
| CONSEC .....             | Consecutive station number.  |
| BOTDP (B) .....          | Uncorrected sounding depth in meters.  |
| SHIP (B) .....           | NODC assigned platform identity code.  |
| DATA USE .....           | Entry 1 identifies DNP data.   |
| AREA .....               | NODC ocean area code.  |
| CLOUD T/A (B) .....      | Cloud type according to WMO code 0500 and cloud amount according to WMO code 2700.   |
| <b>Wave observations</b> |  |
| DIR .....                | Direction from which dominant waves are coming in tens of degrees according to WMO code 0885.  |
| HGT .....                | Height of dominant waves according to WMO code 1555.   |
| PER .....                | Period of dominant waves according to WMO code 3155.   |
| SEA (B) .....            | Sea state according to WMO code 3700.  |
| CL/TR (B) .....          | Water color according to fore-Ule code. Transparency in meters as determined by Secchi disc.   |
| WIND DIR (B) .....       | Direction from which wind is blowing in tens of degrees according to WMO code 0877.  |
| WIND SPD (B) .....       | Wind speed in knots.   |
| WIND FOR (B) .....       | Wind force in beaufort code.   |
| WEATHER (B) .....        | Weather code—If preceded by letter X is according to WMO code 4501. A numeric two digit entry indicates weather according to WMO code 4677.  |
| INST .....               | Instrument used for observation—"Nansen Cast" indicates station consists of Nansen cast data—"STD Recorder" indicates station consists of STD data or a mixture of STD and Nansen cast data.   |
| TRACE DIR (B) .....      | "Trace" indicator U (UP), D (DOWN), and A (AVERAGED)—used with STD casts, and specify that data were taken while hoisting or lowering respectively or that the two traces were averaged.   |
| DURATION (B) .....       | Time elapsed during raising or lowering of the STD recorder to tenths of hours.  |
| ORIG (B) .....           | Originator's reference number in two parts—cruise number or 3 characters (if year of cruise forms part of cruise number years digits may sometimes only be found in "Year" field), and station number.   |
| TEN SQ .....             | Ten-degree square—modified Canadian square number.   |
| 5 SQUARE .....           | Five-degree squares—modified Canadian system.  |
| 2 SQUARE .....           | Two-degree squares—modified Canadian system.   |
| 1 SQUARE .....           | One-degree squares—modified Canadian system.   |
| CASTNUM (B) .....        | Number of cast on multicast stations (blank when messenger time is given).   |
| TIME (B) .....           | Time of release of messenger in hour and tenths for applicable observed levels. If multicast series extends past midnight, 24 hours are added to cast time of next day. Beginning time for STD is given at first obs depth.  |
| LVLTP .....              | Type of record at depth indicated. "OBS"—observed values. For STD recorder = level of data read-out. "STD"—NODC standard interpolated values. "ORG"—Standard or other depths carrying non-NODC interpolated values. "LIT"—Interpolated standard depth values used as obs for computational purposes. Note—When an observed level coincides with a STD depth level, both "STD" and "OBS" lines will appear. |
| DEPTH .....              | Depth of sample (or standard level) in whole meters. Prefix "T" indicates thermometrically determined depth (depth of unprotected thermometers). Subscript "Q" indicates that the value is marked doubtful by the originator. A value designated as implausible by NODC is marked with a "P". Postscript "Z" indicates uncorrected and inaccurate 'Wire-out' depths (high wire angle present).             |
| TEMP (B) .....           | Temperature in degrees celsius. For 'Q' and 'P' notation see depth field.  |
| SAL (B) .....            | Salinity in parts per thousand. For 'Q' and 'P' notation see depth field.  |
| SIGMA-T (B) .....        | Seawater density anomaly to 2 decimal places. When depth, temp, or salinity is doubtful, a 'Q' is suffixed. An asterisk indicates a decrease of 0.02 or more from the previous level.  |
| DYNPTH .....             | Dynamic depth anomaly in dynamic meters to millimeters.  |
| SND VEL (B) .....        | Sound velocity in meters per second to decimeters according to Wilson's formula. (A standard depth-pressure term is used for stations not beginning at the surface).   |
| OXYG (B) .....           | Oxygen in ML/L to hundredths.  |

